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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,481	12/03/2003	John M. Drynan	M4065.0238/P238-C	3991
24998	7590	08/30/2005	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			LEE, EUGENE	
2101 L Street, NW			ART UNIT	
Washington, DC 20037			PAPER NUMBER	

2815

DATE MAILED: 08/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/725,481

Applicant(s)

DRYNAN, JOHN M.

Examiner

Eugene Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 47-78 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☒ Claim(s) 64-68 is/are allowed.
6) ☒ Claim(s) 47-50, 54-59, 69-71 and 75-77 is/are rejected.
7) ☒ Claim(s) 51-53, 60-63, 72-74, 78 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 03 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, an interconnect line ... in electrical contact with said first conductive stud (i.e. claim 1) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

In FIG. 16, the interconnect line 26 is clearly insulated from both conductive studs, and not in electrical contact with either contact (because of insulating sidewall 34).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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2. The drawings are objected to because it is not clear how FIG. 16 can be a cross-section along line XVI of FIG. 15 since line XVI only runs through one conductive plug 36 and not two as shown in FIG. 16. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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4. Claim 47 is rejected under 35 U.S.C. 102(b) as being anticipated by Jost et al. 5,705,838. Jost discloses (see, for example, Fig 5) a semiconductor memory device comprising a conductive layer (first conductive stud) 36, conductive layer (second conductive stud) 38, bit line (interconnect line) 55, and dielectric layer (insulating sidewall) 40.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 48 thru 50, and 54 thru 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jost et al. 5,705,838 as applied to claim 47, and further in view of Bryant 6,188,112 B1, and Matsumoto 6,069,060. Jost does not disclose said first conductive stud being epitaxial silicon. However, Bryant discloses (see, for example, FIG. 5) a semiconductor device comprising a contact comprising a plug 34, and epitaxial silicon region 36. The contact provides a connection to the region 20. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have said first conductive stud being epitaxial silicon in order to have a adequate contact to a region in a semiconductor device.

Jost in view of Bryant does not disclose said second conductive stud being epitaxial silicon. However, Matsumoto discloses (see, for example, column 2, lines 5-44) an electrode made of single crystal silicon by epitaxial growth. In column 14, lines 40-

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57, Matsumoto discloses the electrode having a flattened surface and hence the concentration of electric field into the surface of the electrode can be prevented.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have said second conductive stud being epitaxial silicon in order to prevent the concentration of the electric field, thereby obtaining improved reliability.

Regarding claim 49, and 59, see, for example, FIG. 5, and column 2, line 54 wherein Bryant discloses a plug 34 made of silicide.

Regarding claim 54, see, for example, FIG. 5, wherein Jost discloses active regions (source, drain regions) 24, 26.

Regarding claim 55, see, for example, FIG. 5, wherein Jost discloses word lines (wordline gates) 24, 26 and word line (isolation gate) 16. The word line 16 is disposed on the field oxide 19.

Regarding claim 56, and 58, the limitation "access transistor" is a functional limitation that does deter from the applicant's claimed structural limitations. In addition, Jost discloses (see, column 1, lines 20-46) memory cells formed in DRAMs.

7. Claims 69 thru 71, and 75 thru 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jost et al. 5,705,838 in view of Bryant 6,188,112 B1, and Matsumoto 6,069,060 as applied to claims 48-50, and 54-59 above, and further in view of Tsuchiaki 6,051,509. Jost in view of Bryant and Matsumoto does not disclose a processor. However, Tsuchiaki discloses (see, for example, FIG. 7(a)) an IC device comprising a DRAM A and processor B. The DRAM and processor form components of a microcomputer. Therefore, it would have been obvious to one of ordinary skill in the art

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at the time of invention to have a processor in order to form the DRAM in more robust devices such as a microcomputer.

Allowable Subject Matter

8. Claims 64 thru 68 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The references of record, either singularly or in combination, do not teach or suggest at least a memory device, comprising: at least one first epitaxial silicon stud with a silicide cap and at least one second epitaxial silicon stud without a silicide cap; and a conductive plug within said insulating sidewall and in electrical contact with said second epitaxial silicon stud.

9. Claims 51 thru 53, 60 thru 63, 72 thru 74, and 78 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The references of record, either singularly or in combination, do not teach or suggest at least a memory device, comprising: a first conductive silicon-containing stud and a second silicon-containing stud; wherein said first and second conductive silicon-containing studs are epitaxial silicon, wherein said contact opening is **over** said interconnect line.

Response to Arguments

10. Applicant's arguments filed 6/16/05 have been fully considered but they are not persuasive.

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Regarding applicant's argument on page 9, fourth paragraph of the amendment filed 6/16/05 that feature 38 of Jost is not a second conductive stud but actually a bottom electrode of a capacitor of the DRAM cell, this is not persuasive. In FIG 5, Jost discloses a layer 38, which is clearly a vertical structure that contacts a diffusion layer. Such a structure (even though it is also a bottom electrode), wherein a vertical layer resides in a contact hole through an insulating layer and contacts a diffusion layer, fits the common description of a stud.

Regarding the applicant's argument that Jost fails to disclose "an insulating sidewall separating said interconnect line from said second conductive stud, this argument is not persuasive. The Examiner now interprets the insulating sidewall to be dielectric layer 40. This dielectric layer clearly separates the conductive stud 38 from the interconnect line 55.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

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advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

INFORMATION ON HOW TO CONTACT THE USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee
August 22, 2005

